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Change agent: The Catalyst Story

Summary: with twenty-five years in field technical sales and system design, Phil Smith becomes Product Manager, positioning Teradyne's new Catalyst for the emerging System-on-a-Chip (SOC) market.

At >1200 testers shipped and > \$1 billion in sales, Catalyst led an industry realignment.

Prolog

Any large technical project is a team effort. Many players, many ideas, and much debate are required for success. Thanks need to go to the vendors, customers, and team members involved. Here's a view into Phil's role on the Catalyst Team.

1995 Environment

IC manufacturers had separate design departments for each chip category. Often test floors and support personnel were separated as well. But chip end users wanted more functionality at lower cost, leading to more integration, creating pressure for change.

Teradyne and other tester makers had similarly split tester classes: linear, low cost digital, mixed signal, functional logic, and memory testers. Tester company divisions focused on their own particular segment, competing for sales / corporate resources / future development plan approval.

Trends

Internet and wireless communication expansion were creating optimism and urgency everywhere. Both infrastructure and personal terminal makers were excited. Change was in the air.

There was a clear continued shift toward *algorithms* instead of custom analog circuitry. Digital implementations promised more flexibility and increased design reuse at ever lowering manufacturing costs.

New system chips emerged with combined processor, analog, bus interface circuits. For example, Analog Devices was designing the world's first single chip 56k modem and Broadcom: single chip TV processors, satellite tuners, and data transport devices.

Design departments were reorganizing as integration requirements changed. Test organizations were realigning. Formerly separate digital and analog groups were merging.

AT&T (now Agere) asks Teradyne to combine functional digital and mixed signal testers to match their upcoming chip plans. (This is not the first time this request has been made....)

Teradyne's development path: Two testers

Seeing the trend, Teradyne planned two responses: first, a new A5 mixed signal model with more digital pins, higher data rate, and memory test, and second, a version of the J9 logic tester family with A5 analog instrument options.

Back to the factory

After serving as one of the A500 mixed signal system design team managers, Phil moved in 1986 to develop a new position: field product specialist. The role supported a sales and applications team with a 'virtual factory', helping define sales strategy and communicating technical solutions at any level within customers.

Phil worked to get the first A500 systems into Analog Devices, IBM, Agere and others, advocating Teradyne testers to match the needs of emerging technology chips, and driving joint Teradyne / customer applications projects to completion.

Exposure to increasing chip integration convinced Phil a new tester category was needed. He returned to headquarters in 1996 with a mission.

Phil as Catalyst Product Manager

Phil advocated a change to division management, describing the trends and saying Teradyne's market share would grow more quickly if the company *anticipated* the shift to system silicon rather than following it.

Phil proposed an even more radical thought – change *the system name*. Instead of another 'A5' family member name as previously planned, call it *Catalyst*. Position the system as an *agent of change* in the mind of the customer (and for the same reason within Teradyne).

Division management was supportive, but the name / position proposal did not sit well with everyone.

Company management cautious of 'SOC' position

They questioned diversion away from successful A5 linear / mixed signal line. Teradyne had battled LTX in this space for years and was now on an upward trend. No one wanted that to stop: 'A5' was a strong brand.

The logic tester division was also concerned. Seeing increasing analog content at mid range digital customers, the logic group wanted to keep product line continuity, not introduce competition from within their own company.

Teradyne competitors still had separate products but a belief was stirring that merged product lines might be coming. The choice for Teradyne was whether to wait or lead.

How much will users pay? Who will buy Catalyst?

Testers being relatively low volume, individual prices vary considerably. With chip prices always falling, chipmakers expected the same of their testers. But test subcontracting was on the rise, consolidating production.

Phil worked with management to set Catalyst pricing and discount principles and objectives. He gathered all known competitive data, projected target competitors moves, and executed specific pricing trials at accounts where win possibility was slim and loss consequences could be contained.

With objectives to narrow the discount band (anticipating worldwide subcontracting and more frequent user price comparisons) and put more pricing in software enabling (allowing lower entry price and non-disruptive upgrades), Catalyst market pricing was set.

Years later, while working on pricing for a subsequent system, Phil surveyed the company to discover best pricing practices. The references *pointed back to Catalyst* as the way it should be done.

Selling the first few

Phil supported the target customer sales teams in the new space of *system chip* testing. Catalyst sale into standard mixed signal / A5 replacement applications were back burnered.

Most Teradyne resources stayed on A5 / J9 context while the Catalyst introduction team worked to penetrate the new space.

The sales force was encouraged to look for emerging system silicon devices within their accounts first, places they could get a jump on the competition.

Through trade shows, articles in the press, sales force training, and direct customer contact Phil pushed the message of change. It was working.

Phil stayed involved with all initial customer teams, part of direct selling on site, engaged until systems were in production and the client was well on their way to self-sufficiency.

First Customer cooperation

To insure success, Phil worked with sales to manage a very tight coupling of Teradyne and the first user, Analog Devices. ADI assigned two key engineers, one who actually worked *within Teradyne* for months leading up to the machine transfer to Analog.

The advantage was *shared visibility* and *joint accountability*. Analog learned the tradeoffs involved in large system engineering and was able to adjust Teradyne development priorities. Teradyne learned more about the chipmaker's new silicon concerns: which tools were needed *right now* and which system elements could be completed later.

Although there were always the inevitable surprises, in fact perhaps *because of them*, the experience pulled the two companies closer together and insured longer lasting success.

A year after the first system was installed at ADI, their project engineer presented a Teradyne User Group paper on the advantages of being a 'first system customer' for Teradyne.

Analog Devices and their test subcontractor partners now own dozens of Catalyst systems.

Epilog: >1200 systems and >\$1B later

Catalyst sold into the new combined logic / analog device market as planned. Served customer list lengthened and positions in existing accounts expanded.

Catalyst contributed in a major way to Teradyne's non-memory test market share increase from 31% to 39% (1997 to 1999).

Teradyne's competitors followed. In 1999, LTX introduced 'Fusion' as an SOC tester. HP soon merged their 83000 logic and 94000 analog into the 93000 SOC system.

Industry market research groups created a new category: *non-memory test systems* to track emerging SOC machine market.

At Teradyne, the logic tester and mixed signal tester groups ultimately merged, joining design, marketing and application forces on subsequent systems.

Notes

July 18, 1997 – Catalyst orders from Analog Devices and Samsung
<http://www.hpcwire.com/hpc-bin/artread.pl?direction=Current&articlenumber=11596>

March 3, 1998 – Teradyne and Rockwell form agreement on Catalyst
<http://www.hpcwire.com/hpc-bin/artread.pl?direction=Current&articlenumber=12925>

February 12, 2002 – 1000th Catalyst shipped to Broadcom. World's top selling SOC tester.
http://www.semizone.com/news/item?archive_p=1&category=1&news%5fitem%5fid=100866

March 4, 2004 – Catalyst selected by Fudan University, People's Republic of China. Over 1200 Catalysts shipped so far. <http://www.teradyne.com/std/press/catalyst/2004-03-01.html>

A brief Teradyne milestone list: <http://www.teradyne.com/corp/facts.html#Technical%20Milestones>

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